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A Periodical Devoted to the Manufacture and Use of Composition Products

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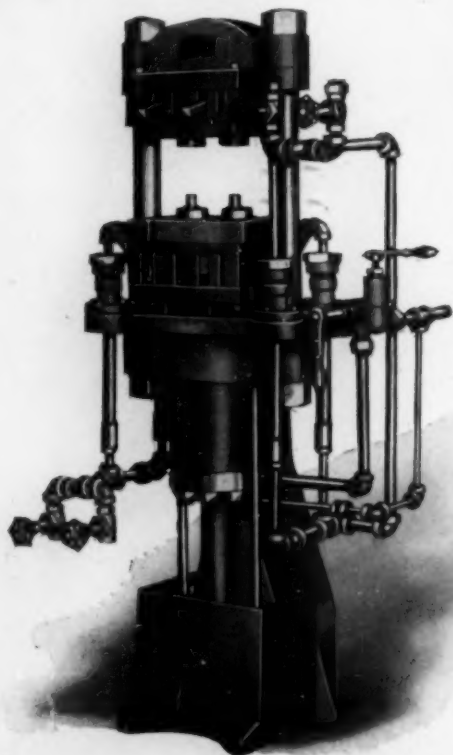
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That daily, **PLASTICS** receives scores of inquiries requesting all manner of information.

That we have acted as intermediary in innumerable cases between the man who had a unique job to do and the maker of special machinery and equipment to do it,

That every outstanding change in personnel has brought the interested parties' story to our columns.

That hundreds of complimentary letters have been received from readers who have received profitable information.

In fact, **PLASTICS** is recognized as the all-encompassing business magazine of this fast-growing industry.

Now that the young year is launched, we, who are in the conning tower of this far flung and diversified field, can predict that it will be the most successful period every enjoyed by the units comprising the plastic trades.

We also anticipate that the growing spirit of co-operation will push us all on to a large, more prosperous and more influential industry than anyone has ever conceived.

The Publishers.

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3

January, 1927

No. 1

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PLASTICS

A periodical devoted to the manufacture
and use of plastic and composition products

Vol. 3

JANUARY, 1927

No. 1

Commercial Production of Casein Solids

I. The grinding of the casein is the first step in this interesting and intricate process

By Heinrich Prehn

Consulting Engineer; German Correspondent
of PLASTICS

This is the beginning of a long series of articles giving the exact details of the manufacture of casein solids or plastics, by an expert. Mr. Prehn is a manufacturer of casein solids, in Europe, and has had many years of thoroughly practical experience in this field, so that articles from his pen should prove exceptionally interesting to everyone who is following the development of the casein solids.

It is hoped to expand the present series into book form after the publication of the material in PLASTICS, and to incorporate at that time further actual working formulae and fabrication methods which should render the volume of great value not only to those intending to engage in this new industry, but also those who are striving further to perfect their products.

The rise of the casein solids industry in the past few years has been phenomenal. The causes for this are manifold. The quality of the goods offered has increased very much, and the production of tubes, besides that of plates and rods as was the custom at the beginning of this industry, as well as great improvements in colors and mottles has opened larger fields for these products. The utilization of casein plastics in new lines is continually increasing the demand, and, in turn causing the material to be better known and appreciated.

For the above reasons, there

has been considerable demand on the part of the larger consumers for definite information regarding the manufacturing details of this useful material, with a view to the possible installation of machinery for the production of the material themselves, so as to make them independent of the manufacturers.

However, the carrying out of such a project is by no means as simple as might be thought. Of course when a certain consumer requires, say, only plates, or only rods, and those in a few standard shades or dimensions, the solution of the problem is

not too intricate. There is no question that casein solids can be more cheaply manufactured than they can be bought, the determining factor being a minimum requirement of such quantity that the operation will be one that can be carried out economically, and in proper proportion to the general overhead of the plant. Obviously there is a lower limit, below which it would most emphatically not pay the consumer to attempt to produce his own casein solids.

A further point which must not be overlooked, is that unless the intending manufacturer, who is a consumer or fabricator of his own casein solids, will be practically precluded from selling his solids to other manufacturers, or at best to dispose of any surplus at a loss.

In every such case the services of an accredited expert in the line of production of casein solids is an absolute prerequisite to success. He must not only thoroughly understand the requirements of the intending producer, but must have the necessary courage to advise against the manufacture if

economic considerations definitely point that way. He must be able to meet the difficulties that arise, and to be able to solve the problems particular to the use to which the casein solids is to be put.

The purpose of the present

2. Manufacture of casein solids by compressing the casein powder.

3. Compressing the product into blocks, and working these into sheets, etc.

These methods will be taken up in the above order, except for such details as are common to all three general methods.

Unless the rennet casein can already be obtained in the form of a sufficiently fine powder, the first step in the manufacture of casein solids is the **grinding** of the casein. At this point it should be pointed out that infinitely bet-

ter results are attained by the grinding of the casein on the part of the solids manufacturer, than by relying upon purchase of pulverized casein.

The mechanical means relied upon for the comminution of the casein are almost universally the so-called centrifugal or high-speed mills, which have been found to be excellently suited for this purpose. Such mills make it possible to produce casein of any required degree of subdivision, which, as will be seen later, is a great advantage. Furthermore, there is less wear and tear on such mills, despite the hardness of the casein, and the grinding surfaces require no period sharpening. A type of mill found very suitable is one known in Europe as a "MAG" universal-mill, which is similar

in appearance to the one shown in figure 1 at the beginning of this article.

The grinding operation is carried out as follows:

The casein to be ground is poured into the hopper at the top of the mill, a suitable chute at the bottom of this hopper allowing of the regulation of the supply of the crude product. An automatic feeding device, driven from the same pulley as the grinding wheels, serves to convey the casein into the grinding-space. The casein first passes a powerful double magnet which serves to remove all particles of iron which might be present, and which, if they got into the mill would play havoc with the grinding tools and sieves.

As soon as the casein enters the grinding-chamber of the

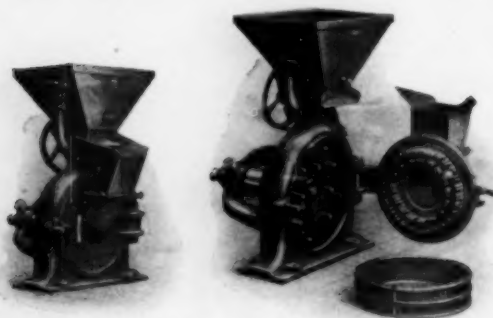


Fig. 1

Fig. 2

treatise on the general topic of **The Manufacture of Casein Solids** has for its main purpose the depicting of an accurate picture of this industry.

This should prove of interest and value not only to those already engaged in this industry, but to those who wish to be well informed as to the production of a competing material, or those who intend to engage in the manufacture of the product. Quite obviously it would be beyond the scope of a series of articles in a trade journal to thus broadcast each and every carefully guarded so-called "trade secret," in fact a good many of the minute details of manufacture would require a discussion so tedious and technical as to tire the average reader. The true intent is to familiarize the peruser of the articles with the type of problem to be met, with examples of specific means of meeting such problems.

Types of Processes.

There are several general means for manufacturing casein solids. All of these necessitate the use of rennet-casein. They are:

1. The most commonly used method employing extrusion presses, which produce rods and tubes. These are also sometimes termed spindle-presses.



Fig. 3

mill it is seized by the rapidly revolving breaker-disc, and given a preliminary break by being violently projected against the innermost row of "dogs" or breakers. (See figures 2, and 3-b.).

The toothed circular grinding rings, which are stationary, and attached to the door of the mill (see fig. 2), and between each of which a disc of breakers revolves at high speed, serve to further comminute the material, step by step. (See figs. 2, and 3-a.). The extremely rapid motion thus imparted to the particles being ground, and the innumerable collisions which occurs between the particles and the metallic parts of the mill, as well as the particles themselves, causes a very fine subdivision of the casein.

After the casein has passed through all the series of revolving discs and breakers, it arrives at a sifting arrangement,

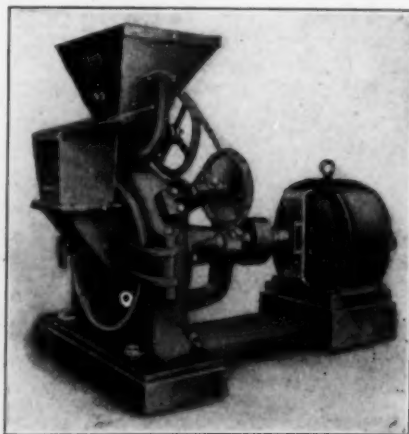


Fig. 4

which, however, consists merely in a slotted or perforated annular ring (fig. 3-c), which surround the breakers and revolving discs. An alternative construction is to have a ring built up from individual rods, like a grate. All the particles which are fine enough will pass

The capacity of the mills depends both upon the size of the crude material as well as the degree of fineness desired in the ground product. The following table gives a general idea of the capacity of five different sizes of the mills just described:

In connection with the above

extra cost in installation will soon be amortized due to the greater relative economy.

Mills of from size 1 to 3, are usually mounted on a wooden or iron base but the larger sizes, as No. 4 and 5, require a specially constructed concrete base. The dimensions of these mills are given in Table 2, which also supplies data as to shipping weights, cubic yards taken up on steamers, etc., as it is possible that the plant would be set up either in other countries, or that the producer may desire to import the mills. (See Table 2).

Not Too Fine

It is very important not to grind the casein too fine, as the size should be just right for the particular type of product, and overly fine ground casein will not produce as good an article. For this reason the proper choice of perforation in the sieve within the mill should be given due consideration. Then again, if the ground casein should consist of a mixture of fine ground or more coarsely ground material, the two kinds would absorb varying quantities of water or other liquid, and would also dye to a different depth of color, and this

TABLE 1

Degree of grinding	CASEIN Perforations of annular sieves	SIZE OF MILL up to pounds per hour.				
		1	2	3	4	5
coarse meal	0.08" slit (slot-sieve)	88	220	660	1320	2640
meal	0.049" round, cylindrical	55	143	464	925	1870
fine meal	0.039" round, conical	44	110	330	660	1320
flour	0.020" round, conical	13	33	100	220	440
dust	0.010" round, conical	11	26	80	165	330
		(with crude the size of walnuts)				
Power required, H. P.		2.5	5	8	12	18
Average speed, r. p. m.		4000	3500	3000	2500	1800

The sizes of the various mills used for grinding casein are shown in this tabulation.

through the slots or perforations, while the heavier particles will be seized by projections at the edge of the breaker discs and again thrown into the grinding chamber of the mill, so that only the finely ground material is discharged.

The grinding discs, both stationary and rotary, as well as the other internal parts of the mills must be made of high grade crucible steel or its equivalent, and should be so dimensioned that they are strictly interchangeable, for replacement and repairs. The finished ground casein is discharged at the bottom of the mill, either directly into a sacking-device, or into mechanical conveyors, or into pneumatic collectors.

Direct Drive

A great advantage, especially when putting in a new installation, is to acquire a mill that has a direct coupled electric drive, with the motor and grinding disc-wheels on the same shaft, as this obviates the necessity of belts and their attending difficulties. Such a mill is illustrated in fig 4. (p. 10)

figures, it should be understood that these refer to averages, and that, in accordance with the nature of the casein, they may be either exceeded or may be lower. The same applies to the data or probable power consumption indicated.

TABLE 2

Universal Mill No.	1	2	3	4	5
Height	23.8"	32"	40.6"	56.25"	73" (inches)
Width (looking at the door)	15.75"	21.7"	28.4"	37.9"	54.3"
Depth (looking at the door)	15.9"	26.4"	33.9"	41.0"	53.6"
Net weight	121	275	660	1170	3018 pounds
Gross weight (when packed for ocean freight)	187	375	794	1369	3440 pounds
Cubic yards occupied by packed machine	0.26	0.72	1.24	2.42	4.56 cu. yds.

Capacity of casein-grinding mills and data on perforations, power consumption, etc., are given in the above table.

A comparison of the power consumption and relative production shows that the larger mills are really much more economical. For this reason, when installing a casein solids plant, it is advisable to choose rather a larger machine, as the

would produce spotty, streaked and otherwise unevenly toned goods. When pressing or extruding casein solids rods in a spindle press, the more finely powdered casein would prevent proper expulsion of entrapped air, and this leads to pores and

blisters in the rods. Such a condition is very dangerous, as it can not be noticed until after the material has been indurated with the formaldehyde and dried, when of course, it is too late to remedy the trouble. Particular pains should therefore be taken in the grinding of the casein. It is attention to such apparently minor details which distinguish the successful from the unsuccessful casein solids product.

Another point in grinding casein is that the mill should be fed with a constant amount of material, and especially must the running of the mill empty be avoided. The mill should at all times remain reasonably cool, and the operator should watch this point by feeling the mill with his hand from time to time.

Grinding Scrap

The grinding of casein waste, or casein solids scrap on the same mill used to grind the raw rennet-casein should be entirely avoided, as such scrap will introduce impurities into the product, which make a rational control of the material well-nigh impossible. Such casein solids scrap should be ground on a separate mill, and this one should also be provided with a preliminary breaker or set of rolls to break up the scrap to a size suitable for proper grinding. When working on a large scale, it is advisable to sift the casein, or screen it, after grinding, so as to obtain perfect control of the size of the individual particles which enter the final mixture.

Pulverized casein, when dry, is practically of unlimited keeping qualities, and can be stored in suitable containers or bins, without danger of spoilage. When once a stock of properly ground casein is on hand, the manufacturing operations can begin. The first step is the mixing of the ground casein with the colors, chemical, etc., as may be required for any particular grade, color or style of casein solids which are to be

manufactured. Needless to say the exact formulae used by the individual manufacturers for the production of a particular mottle, style or color, are obviously trade secrets of that particular plant. Pulverized casein which has received an admixture of moisture, as is the case when coloring the same, will still be apparently dry to the touch, however it should not be stored longer than twelve hours, as even this relatively small amount of moisture will give the product a tendency to become moldy and to rot, which would of course ruin it for further use.

Blending

The mixing of the casein with the colors, fillers, etc., is



Fig. 5. Preferred form of mixer for blending casein solids composition.

of extreme importance, and, except for small experimental batches, must invariably be accomplished mechanically. An obvious error is to mix the material for too short a time. To one who is not familiar with the details of manufacture, it will be truly surprising how long it takes to get a really uniform mixture of dry materials, even in a well constructed mixing-machine. When making transparent products, for example, the mixing is of the utmost importance. Ample time should be allowed to make the mix homogeneous, and the mixing apparatus should be of such construction that there are no dead pockets where material may accumulate without being

properly stirred and turned over.

Of course the choice of mixing machinery is very wide, and most every one has his pet idea as to what is a suitable mixer. Past years of experience has demonstrated to the author that one of the very best types of casein mixer is one similar to that used in Europe under the name of "Fixia II," which is illustrated in figure 5. The peculiar motion of this machine causes a constant turning over of the material, while at the same time it is stirred, lifted and dropped, and cut through. The single stirrer-arm, which, however, can be substituted by a double-arm machine, just clears the bottom of the mixer, without touching it, so that there are no dead spots in the bowl. The bowl also slowly revolves at the same time. All of this contributes to relatively rapid, but nevertheless very efficient mixing. The bowl, which can be wheeled from under the stirrer-arm, is only about 80 cm. (31.5") high, so that it is readily handled and emptied. Both the stirrer and bowl must be of perfect construction, and should be tinned with pure block tin, so that they can be easily and thoroughly cleaned after each mixing, or when changing colors. Several bowls should be provided for each stirrer, as thus it becomes possible to get the most out of the machine, as one mix may be made while the previous mix is being emptied from the bowl.

Mixing Speed

A word of warning regards mixing speeds is not out of place. The mixer must not run too rapidly, as rapid mixing is sometimes very inefficient. It is hard to give any actual figures, as the various mixing machines on the market are so different from each other; but about 20 to 40 r. p. m. (of the stirrers) are about right. The same applies to the mixing-

(Continued on page 28)

"Thiolite" Resin Contains Sulfur

Method analagous to vulcanization is used
in manufacture of new condensation product

By Andre Samuel

From Comptes Rendus, 1926, 182, 207

THE number of resins, and especially the types suitable for molding purposes, is continually being augmented. A new material, which gives great promise of becoming very useful, is described by its discoverer in the *Comptes rendus of the French Academy of Sciences*. A short resume of this product is given herewith.

The remarkable change which takes place in the dielectric properties of certain natural materials, such as rubber, when the same are treated with sulfur, or vulcanized, raised the question as to whether a similar reaction might not take place also when various synthetic resins are treated in the same way.

Based on these premises, research was undertaken upon the action of sulfur, and especially of sulfur derivatives, upon phenol resins. The work was soon restricted to the application of sulfur to the partly polymerized or condensed phenol-aldehyde condensation products, as it was found that most success was to be found in this direction. The material employed was an intermediate condensation product of phenol and formaldehyde, prepared and dehydrated in the usual manner, but with the polymerization arrested at the point where the material was in the viscous and soluble stage, and still highly soluble in alcohol and in acetone.

While in this viscous condition it was carefully treated with sulfur monochloride, S_2Cl_2 , the hydrochloric acid which

formed as the result of the reaction being neutralized as fast as it formed, so as to prevent further polymerization of the resin due to the acid. The reaction was stopped as soon as no more sulfur chloride was taken up.

Vulcanizing

It was found that the amount of sulfur monochloride consumed was fairly constant, and amounted to about 12%, and that the final product was quite uniform in every case. The product, as it was still soluble, could readily be purified by dissolving and precipitating a few times. In its final purified form the resin is a white powder having a density of 1.8. The exact nature of the product and its chemical constitution have not as yet been determined, but the name *Thiolite* has been given to it on account of its sulfur content. *Thios*, (Greek for sulfur). The reactions studied by the inventor show that all of the sulfur of the sulfur monochloride enters the molecule of the new resinous product, and that all of the chlorine is liberated in the form of hydrochloric acid.

Thiolite is entirely odorless, despite its origin. When powdered it has the desirable properties of softening at about 80°C. under atmospheric pressure, and finally to fuse. If heated higher, and under a few kilograms of pressure, it will polymerize and harden quite rapidly, and without giving off any gases. At about 150°C. this action is almost instantaneous so that the *Thiolite* can be em-

ployed for molding various objects in a manner similar to that used with other synthetic phenol resins. When thus polymerized the new product is entirely insoluble in all of the common organic solvents.

It is infusible and non-flammable, and does not even soften when heated; nor does it absorb moisture. It is apparently highly resistant to chemicals. Although some of this material was made as long as four years ago, it is still in exactly the same condition as when first made.

Solubility

One of the most desirable properties of *Thiolite* is its ready and high solubility, in the unpolymerized stage, in organic solvents such as alcohol, hydrocarbons, acetone, ethyl acetate, furfural, mesityl oxide, cyclohexanol, pyridine, etc. This allows of its application in the form of a solution or varnish. These solutions leave the material behind in the form of very tenacious films which possess the highest insulating power of any synthetic resin thus far developed. This applies, of course, to the films after they have been hardened or polymerized by heating. As no disengagement of gases occurs in the process, the films are perfectly impermeable and also insoluble.

An excellent example of the remarkable dielectric strength of the polymerized *Thiolite* is the behavior of a copper rod when the same has been lacquered with a *Thiolite* solution and the film hardened. Such a

(Continued on page 26)

Plastics in the Daily Press

THE *New York World* on Dec. 6, 1926, carried a very interesting article on the increasing utilization of synthetic materials, from which we reproduce here the most pertinent passages carrying allusions to the Plastic Materials.

"Scarcely an industry exists which is not now affected by or dependent on these compound products, which are remaking the organization of trade in many lines. Rayon, the resin compounds, artificial leather, lacquer, celluloid, synthetic fertilizer are a few of the comparatively recent contributions that science has made to modern industry. ***Practically no natural product is entirely safe from the possibility of competition from a synthetic rival.

"Synthetics possess four advantages of paramount importance to the manufacturer in reckoning costs which are calculated to make permanent their replacement of the natural product they supplant. These advantages are price stability, usually lower prices, since the new product must win its market from the older natural one, uniform quality and rapid adjustment of supply to meet the demand.

Pyroxylin Products

"Nitrocellulose is the source of perhaps the most important group of synthetics outside the coal tar products, a group that affects a very wide range of industries. Nitrocellulose is made from wood, cotton or some other readily available cellulose treated with sulphuric and nitric acids. Rayon, so called artificial wool, lacquer, cellophane, artificial leather and celluloid are some of the best known nitrocellulose synthetics.

"Another cellulose product that is making itself felt in an entirely different field is pyroxylin lacquer, a smooth, durable, easily applicable and fast-

"Science Is Called Into Service to Devise Substitutes for Raw Materials," is the way a head-line writer in the New York World characterizes the essential features of a statement made by Mr. J. B. Collins, of the National Bank of Commerce.

The realization of the destiny of synthetic materials in the commerce of the future, by so well a recognized authority as Mr. Collins, is particularly interesting to all who come into contact with the new raw materials which are being augmented daily.

drying finish suitable for a wide range of uses. Placed on the market about four years ago, it is used in place of varnish on automobiles and has made phenomenal progress. Lacquer means a double substitution of chemical for natural products because its pyroxylin plastic base takes the place of the varnish gums which we import from the Orient, and chemical solvents displace linseed or tung oil or turpentine."

Lubricants From Pyroxylin Scrap

LUBRICATING compounds from film scrap is the suggestion of Percil Charles McKee, of Chicago, Ill. Realizing that huge amounts of old film are available, and that the film can be used just as it is, without removing the gelatin or silver, it is interesting to see what the inventor attempts to do. In his U. S. P. 1,603,086, issued Oct. 12, 1926, he says that to make the lubricating compound, one proceeds as follows:

In carrying out the invention, there is utilized a mixture of un-

washed celluloid which is scrap picture film comprising celluloid coated with a gelatine containing silver. The celluloid is dissolved with acetone to reduce it to a liquid state or instead of using acetone, a solution of equal parts of acetone and a mixture of equal parts of ether and alcohol to dissolve the celluloid may be used. Sufficient quantity of the solvent for the unwashed celluloid to obtain a viscous liquid is all that is required.

Bronze Powder Added

To a five gallon solution of unwashed celluloid and acetone, approximately a half pint amyl acetate is added. Graphite flake is then added in the proportion of five pounds and gold bronze in the proportion of one-fourth ounce to five gallons of the latter solution. The gold bronze is of the ordinary commercial grade of radiator bronze comprising a copper, tin and zinc alloy. The mixture so formed may be applied as a lubricant, but if a heavy body of lubricant is desired, a filler material of vulcanized fiber chips or wood chips may be thoroughly stirred into the mixture in the proportion of approximately two quarts of filler to five gallons of unwashed celluloid and acetone. Alcohol may be used as a solvent to reduce the viscosity if desired, depending upon the manner in which the lubricant is to be applied. The gold bronze has a dual function of precipitating the graphite and holding it in solution thus preventing settlement and further the gold bronze is a hardening agent which increases the hardness of the lubricant after it has solidified.

A five gallon mixture of this lubricant contains substantially five pounds of gelatine and a varying quantity of silver, these elements being present in the film scrap.

The gelatine provides the adhesive quality to the lubricant in its liquid state and the silver is a hardening agent.

Increasing the Dielectric Strength of Molded Phenol Resin Products

Baking after completion of the parts causes molecular changes which produce the desired effect

A RECENT patent assigned to the Bakelite Corp. by Gilbert L. Peakes (U. S. P. 1,602,249), covers the raising of the dielectric strength of molded phenol resins when the same are heated to a fairly high temperature.

It has been found that the dielectric strength of molded phenol resins, although fairly satisfactory at ordinary room temperatures, will, under certain circumstances, be very much lower at temperatures around that of boiling water (100°C), and the present process is aimed at a means for remedying this condition, by a sort of ageing process to which the hot-molded phenol-resin products are subjected.

Further Heating

In accordance with this invention, the products are subjected to an additional heating separate and distinct from the heat used in molding. The temperatures range from 125 to 135°C, and the time from 48 to 80 hours. The time varies somewhat with the temperature, a higher temperature requiring a shorter time, and vice versa.

To quote from the patent:

"Molded phenolic compositions to which this treatment is applicable ordinarily vary rather sharply with the temperature in their insulating quality, or dielectric strength, as measured by determining the volts per mil at which the sample will puncture when subjected to a gradually increasing voltage stress in accordance with the standard procedure of the American Society for Testing



Type of insulation to which this process is applicable.

Materials; the insulating value, commonly referred to as the "dielectric strength," being at 100°C. only a fraction, usually of the order of 10 to 25 per cent, of its value at room temperatures. An important effect of the heat-treatment is to yield a product having at 100°C a dielectric strength approximating much more closely to the dielectric strength measured at normal temperatures. Articles properly treated in accordance with this invention exhibit a dielectric strength at 100°C which is upward of fifty per cent of their normal dielectric strength in the non-treated state at 20°C, and in many cases 70-80%, or even 100% of this value. In exceptional cases higher values are observed, but this usually occurs when the dielectric

strength of the untreated product is abnormally low.

The effect of the heat-treatment upon the dielectric strength at normal temperatures, commonly referred to as the "dielectric strength-cold," is much less marked, and may even be negligible from a practical viewpoint when the molded composition has been so compounded and fabricated as to possess initially a very high cold dielectric strength. On the other hand, when the article, owing to causes not definitely determined, exhibits an abnormally low cold dielectric strength, the effect of the described treatment is to improve this value, raising it to or above the standard cold value. It will of course be understood that in those cases where an abnormally low cold dielectric strength is due to porosity of the article no marked improvement can be expected from the heat-treatment.

Results Obtained

Since the molded phenolic compositions whose treatment is contemplated herein may vary widely in dielectric strength with variations in proportion and nature of the filler or binder, with the molding conditions, as well as with many other factors, it is not practicable to give absolute average values indicating the effects of the treatment; in a typical case however a hot press molded test sheet from a commercial black molding mixture known as No. 420 gave results which showed very plainly the marked improvement the "dielectric strength hot" of the products.

(Continued on page 40)

With the Pioneers. V.

John H. Stevens Retires After Active Career

Will devote himself to consulting work. Was one of the collaborators of John W. Hyatt

AFTER half a century of active service J. H. Stevens, Celluloid Expert, has been relieved of manufacturing routine and will hereafter be associated with The Celluloid Company in an advisory capacity.

The business history of Mr. Stevens is also that of Celluloid, for he was the first employe and, as a mere boy assistant, was present when John W. Hyatt made the original specimen of Celluloid—a dental plate. He was also contemporary with Parkes, Pierson, Spill, and other pioneers in cellulosic plastics. Under the training of Celluloid experience and the example afforded by Mr. Hyatt's productive energy Mr. Stevens passed successively through various departmental positions and, upon the retirement of Mr. Hyatt, became the company's expert.

Many Basic Patents Granted to this Inventor

Mr. Stevens has taken out seventy-four patents, most of which are in the plastic field. Some of his pyroxylin solvents gave a new impetus to the art. Prominent among them are amyl acetate, fusel oil, acetone combinations, methyl-ethyl-ketone, ethyl acetate mixtures, acetanilid and ethyl acetanilid.

No less important was his wheel or belt apparatus for making the endless films used in moving pictures. It is now of universal employ.

Mr. Stevens believes that pyroxylin plastics, including photo film, are still in their early stages of growth and susceptible of further substantial improvement in quality and applicability. He proposes to participate in this work of devel-



JOHN H. STEVENS
Celluloid Pioneer

opment by means of several unique inventions which he has in contemplation. As for coloration he says that this important phase of the industry is as yet in a barbaric state from which it will doubtless emerge with highly profitable effect.

He is now filling in his spare time on advisory matters within his particular province, especially subjects associated with patent procedure and litigation in the field of plastics, also factory and cost systems.

It has been his good fortune to be on the winning side of his numerous cases, the nearest approach to loss being the abandonment of his urea patent interference with Dr. Schuepphaus. This was due to the surprising discovery that Hase had used urea for stabilizing collodion as early as 1854.

Mr. Stevens has been advisor

to the customs authorities on tariff questions and in association with the government chemists originated the 2B denatured alcohol for pyroxylin plastics.

Many years ago, when celluloid was invented, Stevens was already working with Hyatt, and collaborated with him during his entire career. Many of the machines and devices used in the celluloid industry today were originated by Stevens. In fact much of the mechanical development of this art was due entirely to his efforts. Mr. Stevens resides at South Orange, N. J.

Camphor Imports.

The consumption of camphor, both natural and synthetic, are considerably on the increase. According to a very recent statement of the Bureau of Foreign and Domestic Commerce, at Washington, the amounts of natural camphor entering the United States during October, 1926, were not only higher than for October, 1925, but were higher than the monthly figure for some time past.

The October, 1926, imports of crude natural camphor were 317,000 pounds, valued at \$179,000. Imports of synthetic camphor were also high and attained a valuation of \$151,000, equivalent to 307,000 pounds.

Making mottled
molded goods.
In February!

Molding Without Hydraulic Presses

Plaster of Paris molds and the use of compressed air make accurate shaping possible

A PROCESS which is intended by the inventors mainly for the production of artificial dentures, discloses, however, a method of molding the hardenable phenol resins without the necessity for using a metal mold or an hydraulic press. (G. and N. Hick, U.S.P. 1,585,348, May 18, 1926.)

The invention primarily comprises a method involving the use of a porous plaster of Paris mold, but the method is applicable to the production of quite a line of products, such as artificial teeth dentures, artificial limbs or other similar objects.

Using Gas Pressure

The invention is described in connection with the manufacture of artificial dentures. For this purpose an impression is taken in the ordinary way and a denture with porcelain teeth is then set up and molded. The teeth are formed of porcelain or like material, but the plate is formed of wax or other easily melted material. The wax denture is then surrounded by plaster of Paris in a suitable receptacle, the plaster being arranged in two or more parts which are separated. The wax is thereupon scalded out leaving the porcelain teeth in situation in one of the parts. This part of the mold is then painted thoroughly with oil such as linseed or olive oil, and the mold is now heated and carefully filled with the material of suitable color in a plastic state, the complementary parts of the mold similarly painted being then set up in position and clamped together. The assembled mold is then heated in a boiler or other suitable apparatus to the temperature required to

In March, 1926, page 87, an article appeared in PLASTICS which dealt with the preparation of molded articles simulating foodstuffs, for purposes of display in cafeterias and the like. The great expense of making molds for such shaped articles of slices of tomatoes, asparagus, fruit, etc., made such an undertaking difficult.

A process based on the present method, with modifications to comply with the nature of the material should prove quite valuable for anyone who has the means to experiment along these lines.

harden the material, usually between 250 and 300 degrees Fahrenheit, after which the molded article is removed and filed and sandpapered and polished as desired. By coating the plaster with oil the material is prevented from running, and that whereas without this operation the material would be liable to run into the pores of the plaster and might even unite with the plaster in such a way that the two were afterwards incapable of separation, with above method the product remains separate and truly retains the shape of the molded article. Further, the pigment carried by the oil is caused to enter the material and modify its color in the present case, to accord with that of the gums.

The invention further comprises a modification of the above process intended more par-

ticularly for proving false gums of improved appearance in ordinary vulcanite dentures. For this purpose a thin strip of material is taken, the lower edge being festooned to agree with space between the teeth. The denture is heated and the said strip is then applied to its front face and molded as desired. The exposed face of the material is then covered with a putty formed of whitening and oil of the kind referred to in the previous process, and the whole is then invested in plaster of Paris and heated in a boiler or other suitable heating means to harden the material.

In both cases the heating process can be carried out in an ordinary dental closed boiler which is usually fitted with a pressure gauge and worked at a pressure greater than atmospheric and capable of increase up to about 100 lb. per square inch.

In the heating process it is necessary to prevent the material from bubbling which it is liable to do at the temperatures necessary for speedy hardening. This is effected by increasing the pressure in which the material is heated and so raising the temperature of its boiling point. By using as a heating medium the vapor of alcohol or methylated spirits boiled in an ordinary closed dental boiler at a pressure of about 40 lb. per square inch, a satisfactory hardening of the material can be affected without any liability to the difficulty referred to. It is to be noted, however, that especially with the formation of devices other than dentures the material may be hardened by any other suitable means at any other suitable tem-

(Continued on page 31)

Methods in Use for Polishing Casein and Similar Plastics

Polishing Ivory Nut Buttons

These are best polished, directly after the first treatment with pumice powder, by tumbling them with a mixture of American tripoli powder, stearic acid, carnauba wax and ivory nut shavings; the latter being a natural waste product of the manufacture of the buttons. A very high gloss is obtained.

Polishing Artificial Horn and Casein Articles

The usual way to polish a large number of relatively small casein articles (such as beads, for example) is to tumble them with tripoli powder, which is usually mixed with materials to carry the powder, such as felt, cloth or leather cuttings, together with a fatty substance which will keep the tripoli on

the carriers. To obtain a higher gloss, tumbling in a mixture of tripoli, stearic acid and carnauba wax gives good results. For the very highest polish, however, a final treatment may be given as follows:

The good are tumbled in nothing more than a paste of the polishing agent (i. e. tripoli) which has been made by moistening the powder with a mixture of benzine and alcohol. The volatile liquid rapidly evaporate and the final polish is thus accomplished purely by the powder, producing an exceptionally brilliant finish.

(The above suggestions are contained in answer to inquiries directed to the editors of *Butonia*, in Germany).

Domestic Exports of Pyroxylin Products From the United States, By Countries. For October, 1926

Countries	In sheets		Manufactures of	
	lbs.	Dollars	lbs.	Dollars
United Kingdom	10,885	13,992	49,144	47,713
Belgium	3,536	4,720	.....	.....
Germany	1,799	2,300	300	425
Irish Free State	77	100	.....	.....
Netherlands	.....	.....	63	570
Spain	.....	.....	34	40
Switzerland	.....	.....	6	49
United Kingdom	10,885	13,992	49,144	47,713
Canada	66,992	52,427	80,689	94,296
British Honduras	.....	.....	11	48
Guatemala	17	20	21	103
Honduras	.....	.....	7	18
Nicaragua	.....	.....	26	329
Panama	403	400	31	122
Salvador	.....	.....	39	192
Mexico	361	360	466	1,357
Newfoundland and Labrador	.....	.....	1,181	569
Cuba	35	47	622	1,431
Dominican Republic	.....	.....	70	46
Virgin Islands of United States	.....	.....	17	51
Argentina	.....	.....	643	1,314
Colombia	38	53	408	936
Ecuador	.....	.....	28	28
Venezuela	.....	.....	250	165
China	39	42	30	70
Java and Madura	115	130	.....	.....
Japan including Chosen	.....	.....	300	500
Philippine Islands	.....	.....	300	500
Australia	27,374	21,703	21,770	18,754
New Zealand	.....	.....	590	819
British S. Africa	.....	.....	138	405
Total	111,671	96,294	156,984	170,806

The above statistics are published monthly and are an interesting index to the trend of the trade in these products.

New Hearing Sought On Bakelite Appeal

Washington, Dec. 20.—Importers of synthetic phenolin resin and articles made therefrom have petitioned the tariff commission for a new hearing on the application of the Bakelite Corp. for an order excluding such foreign products on the ground of unfair practices, which involved charges of patent infringement and trademark abuse.

The basic patents on the raw material expired Dec. 6, thereby closing part of the investigation which has been before the commission for some months, but the Bakelite Corp. alleges certain related patents are effective. The application for a new hearing may be brought before the commission tomorrow.

The Corporation is, however, still in control of the more important laminating and gear patents which are capable of being invoked against infringers.

Inda at the Power Show



Through the courtesy of Mr. J. M. McCarthy, of the advertising department of the American Machine and Foundry Company, Brooklyn, N. Y., manufacturers of Inda, we are able to present a photograph of this organization's Inda Display Case at the Power Show held at the Grand Central Palace, New York City during the week ending December 11.

Mr. H. F. Baker who was in

charge of the exhibit, spent several years in England studying the molding of plastics. Sixty-five color effects were displayed covering a large range of toilet articles, paper knives, pen holders and the like. An ash tray made of Inda was a feature of the exhibit, while materials ranging from transparent colorless to jet black opaque were represented.

Safeguarding Pyroxylin from Fire

A detailed study of the combustion of cellulose nitrate products both from the theoretical and practical viewpoints

By A. Helle-Staux

From Revue generale des matieres Plastiques, 1926, 2, p. 214

PYROXYLIN plastics and analogous products, whatever their commercial names, are daily finding more numerous applications in the arts and in industry—motion picture films, toilet articles of the most diverse descriptions, enamel-like covering for woodwork, artificial leather, knife handles and so on. The shape and appearance may change, but it is always pyroxylin plastic.

Fires of Pyroxylin Plastics Consist of Burning Gas

Insurance companies do not fear pyroxylin plastics as explosive, although the gas generated from the heated material decomposing in a confined space is explosive when mixed with air in certain proportions. The hazard is that due to a combustible material, burning very rapidly, able to burn even without air, thanks to its oxygen, a combustible, which even without a flame, can decompose spontaneously into a highly inflammable gas carbon monoxide, the latter a violent poison when breathed in any quantity.

Pyroxylin plastics can pass readily from solid to inflammable gas at a fairly low temperature, and so are the most difficult materials in daily use to protect from fire. Without any fire, just raising the temperature to 150°C. is enough to gasify them.

This quite unique quality of inflammability is due to oxygen combined with cellulose, in amount insufficient for complete oxidation, yet, once decomposition has set in, sufficient for it to continue, with enough heat

development under favorable conditions, to raise the temperature of the gas to ignition. Such a decomposition is known scientifically as "exothermic", meaning "giving out heat," as distinguished from the decomposition of the majority of substances, a process requiring outside heating.

Viscoloid Dryhouse Explodes

In connection with the article on this page the following news note again calls attention to the need for everlasting care in handling pyroxylin.

Dryhouse No. 13 in the northern section of the plant of the DuPont Viscoloid Co., at Leominster, blew up on Monday, December 13, at midnight. The city department used three lines of hose and fought the flames for an hour and a half, succeeding in keeping other similar structures nearby wet down. The estimated loss is \$15,000.

The building was one story of brick construction, and was divided into three sections by fire walls. Two of the apartments which contained the pyroxylin stock were demolished. The other section was occupied by a blower which supplied the dryhouse with heat and it is believed a spark from the machine ignited the celluloid and caused the explosion, which also broke windows in adjoining buildings of the plant.

From the analysis of the decomposition gases of pyroxylin plastics, it appears that they are explosive as well as inflammable. Their chemical composition varies appreciably with the pressure, a circumstance which would explain why analyses made in America and in Germany have given very different results.

When mixed with air, the burning of these gases is often followed by explosion, but experiments made by the Eastman Kodak Company have shown that with automatic sprinklers, provided with a good supply of water, these gases lose all explosiveness and are only slightly inflammable.

From this the Germans think that the camphor vapor is one of the important factors in the explosion of the gaseous decomposition products. Subjected to the spray of cold water from the sprinkler or other extinguisher, this camphor is condensed and removed, leaving behind so little carbon and hydrogen—themselves diluted with inert gases—that explosion becomes impossible and combustion only proceeds at very high temperatures.

Residual carbon in the form of very fine powder is very prone to catch fire spontaneously. This hazard, additional to the possibility of spontaneous combustion following overheating, makes it urgently necessary, after a fire, carefully to remove all the residual pyroxylin plastic. Too often it has been the

(Continued on page 30)

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(Continued on page 30)

Now just who *did* invent casein solids?

Germany also lays claim to the honor of being the first in the field with this useful material

IN connection with the Twentieth Anniversary of the Vienna Branch of the Internationale Galalith Gesellschaft Hoff & Co., which was celebrated by this concern on July 1, 1926, there appears a very interesting account of the way the invention of the internationally known casein plastic Galalith, is said to have come about.

While we cannot, of course, vouch for the absolute correctness of the statements, it is quite probable that the invention of this material did come about as appears in a recent issue of the German periodical *Butonia*. (1926,35,304).

About the year 1897, in Germany, there arose a demand for a white washable tablet for use of school children who were learning to write, as it appeared that the old-fashioned slate and slate pencil, producing white lines on a black background were not at all satisfactory; probably because of the difficulty in reading such writing without unduly tiring the eyes.

Krische and Spitteler

A Mr. Ernst W. Krische, a partner in the firm of Edler & Krische, of Hanover, Germany, manufacturers of blank books, and general printers and lithographers, began work on this problem, which, as is quite evident, at that stage of the proceedings presaged nothing at all of what was later to develop. Mr. Krische had the happy idea to coat ordinary paper with casein, with the purpose of providing a smooth writing surface from which ordinary pencil writing could be removed by a moist cloth. However, it was soon found that the casein was softened and eventually removed,

In several previous issues of **PLASTICS**, the origin and rise of the European casein industry has been touched upon.

Here is the German slant on this subject.

rendering these new "pencil-slates" useless.

Mr. Kirsche realized that he needed some help on the problem, as his knowledge of chemistry was very limited. Accordingly he got into touch with a Mr. Adolf Spitteler, who was at that time associate editor of a paper journal, and a chemist, and efforts were made to render the casein resistant to moisture.

During the experiment the horn-like insoluble and hard casein product was discovered. The two workers immediately realized that an invention of great value had been made and patent applications were at once filed in Germany and all civilized countries. (German patents 141309, 147994, 241887) (U. S. P. 646844).

A Mr. Knuth, brother-in-law of Krische, and at present the General Director of the Galalith Co., became interested in the newly discovered substance. He at once recognized the commercial possibilities and experiments were eagerly prosecuted, covering a two-year period. At the end of this time sufficient progress had been made to place the product upon the market. The development work was done in conjunction with the firm known as the Vereinigte Gummiwaren Fabriken Harburg-Wein, vormals Menier—J. N. Neithoffer. A suitable name was

coined based upon the Greek names for milk (gala), and (lithos), this being *Galalith*, or, literally "milk-stone."

Shortly afterwards the present company controlling this product was founded. The first plant was at Harburg on the Elbe River in Germany; then followed other plants at Paris, Levallois-Perret at Landrecies, Northern France, and employed about 3,000 workers.

The business has proven highly lucrative and has grown very rapidly. The main plant at Harburg, for example, built and operated under the supervision of a chemist by the name of Dr. Bartels, at present covers 21,000 square meters. It is so located that shipping can directly approach it from the Elbe River on one side, while the other side has direct rail connections to the railroad leading from Hamburg to Hannover.

The article closes with a description of the many uses of the casein plastics, which of course are well known to our readers.

Casein Available in New Zealand.

Trade Commissioner E. G. Babbitt, Sydney, reports that a New Zealand firm reporting to have important connections with factories producing both lactic and rennet casein is desirous of communicating with American firms which are interested as purchasers of casein. On October 1 the New Zealand firm reported that they had sold their output up to the end of January but would consider offers for shipment after February 1. Their name can be obtained by accredited firms upon application to the Chemical Division, Bureau of Foreign and Domestic Commerce, Washington, D. C.

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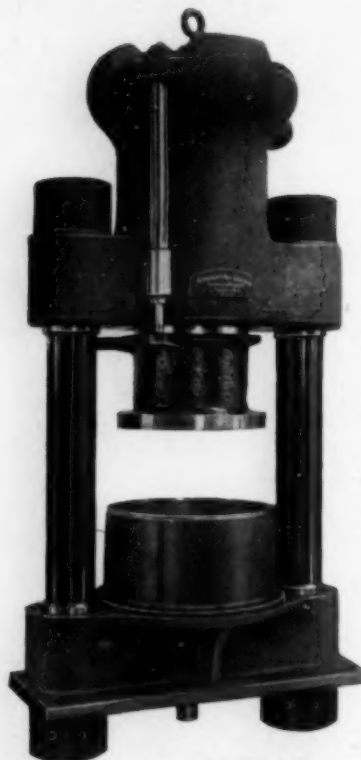
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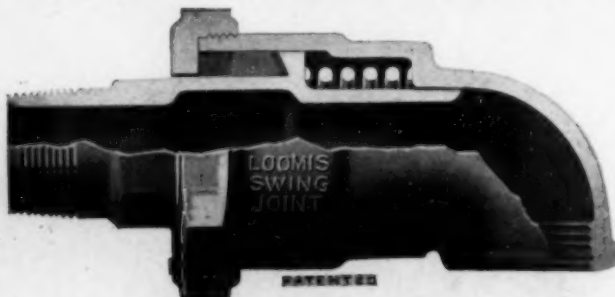
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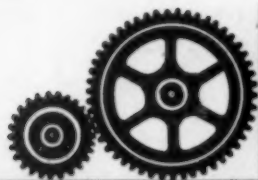


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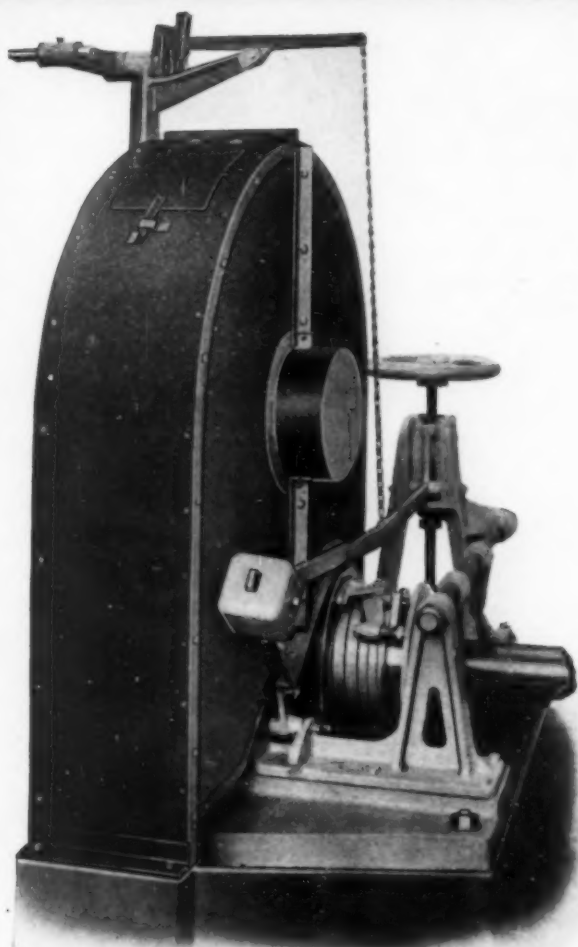
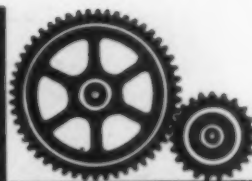
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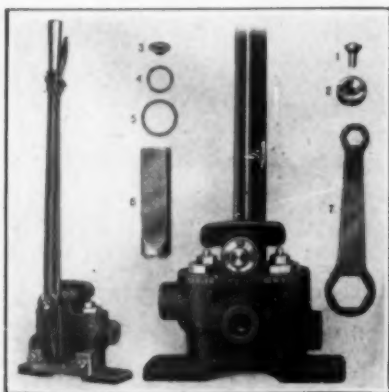
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EDITORIAL • IMPRESSIONS

New Members Of The Family

THE average consumer or purchaser of plastic materials most probably has mentally, at least, classified the present-day material offered him into three general categories—each of which present certain advantages.

There are first: the pyroxylin plastics—capable of high colors, transparency, and producible in very thin and flexible sheets. In their particular field they are free from all competition on the part of either the casein solids or the molded resins. For forming from sheets, by drawing and blowing, they are, thus far, unmatched. Only the cellulose acetate and cellulose ether plastics share certain qualities with them—but they have not been active competitors on a price basis.

Next: the casein solids. They can effectively compete with the pyroxylin plastics in such fields where relative stiffness is an advantage rather than a handicap; such as buttons, toilet-ware, combs, etc. Where great flexibility is needed, they are still inferior to the pyroxylin products. This is true especially in films, and where high transparency is essential.

After these: the molding powders, including for this purpose all of the phenol resins as well as the natural products such as shellac. Here are advantages possessed by none of the others, but again one thing is lacking: transparency and high flexibility. Even granting that vivid colors can be produced, the really fine mottled and translucent effects of the earlier mentioned plastics is absent. On the other hand, there is great latitude in design, and in large-scale production possibilities.

Recently, and more specifically abroad, other plastic materials have gained a certain vogue. Just enough, in fact, to alarm the manufacturers of the established lines of products. blood plastics are one example; the urea-formaldehyde "organic-glass" type of products are the other.

The former are already threatening the casein plastics, especially in the button field; and, where transparency is not required, are actually being made in huge quantities. Objections have been raised in certain quarters against the unsavoriness of blood plastics, but it is difficult to see wherein they should differ from other protein plastic substances, especially when hardened with formaldehyde.

How Would YOU Like It?

SUPPOSING you had evolved a nice new design for some particularly attractive and saleable article; had spent large sums in working out the most suitable color-schemes, and had invested further quantities of hard cash in raw material, boxes and advertising and sales propaganda; and then suddenly found your pet (?) competitor had not only plagiarized your design to the T, but had beaten you to it in prices?

It would make you **M a d**; and no mistake about it.

Now that is **one** thing that seems to happen most often in the toilet-ware line? Why?

Surely no one cares to admit that the business ethics of that branch of the plastic arts is lower than any other; but the condition exists. The remedy is quite obvious.

The Pyroxylin Fabricators

PLASTICS

The urea-formaldehyde products combine plasticity with transparency—which is distinct departure. It is too early to venture any predictions as to the future of these compositions; but the possibilities certainly are intriguing.

Interest in certain marine algae or sea-weeds has been revived, and a large plant is just about ready to produce alginic acid compositions on the Pacific coast. This will make available still another binder for plastic materials. Although discovered as long ago as 1883, nothing has been done commercially in the United States until very recently.

Thus it will be seen that the New Year presents ever new problems, and that the choice of material confronting the prospective user of plastic materials is ever widening.

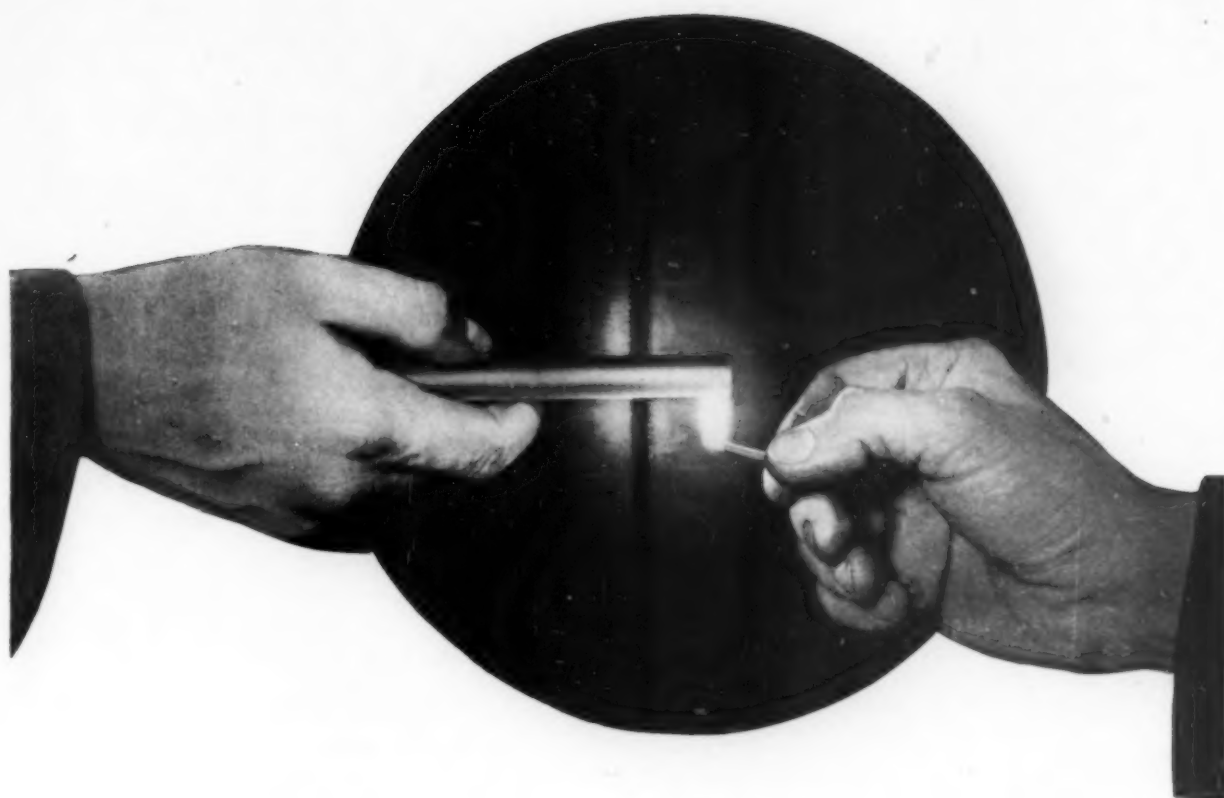
have inaugurated means for registering of original designs, and when once all of the worthwhile manufacturers belong to this organization, the trouble should about be over. There is, however, a certain class still to be considered; and that is the "little fellow" who just simply won't join up and act according to "Hoyle."

A few vigorously conducted law-suits under the unfair practices or unfair competition provisions would put the "fear of the Lord" into these disturbing elements. The organization itself might furnish at least part of the funds.

Credits

THE radio trade has been notorious for some time for its poor credit risks. It seemed that no sooner did a manufacturer of radio sets start production than a new invention or

(Concluded on page 35)



Non-Inflammable

THERE are many reasons why Inda—the perfected casein solid—is a particularly desirable material for the fabrication of thousands of useful and ornamental products.

To speak of its homogeneous

structure, its rare beauty, its wide range of colors, both plain and mottled, the ease with which it may be cut, drilled and polished, and other points of a sim-

ilar nature, however, is to miss entirely its most important characteristic.

Inda is absolutely non-inflammable. It will **not** burn. And in that simple statement there is summed up a world of value for the commercial fabricator.

Inda is now available in sheets, rods and tubes, in many sizes and in plain colors and color combinations.



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Another Camphor Substitute

German Dye Trust Patents New Compositions

The search for suitable substitutes for camphor in the compounding of cellulose ester composition proceeds apace.

According to a recent patent of Otto Schmidt, Theodor Eichler and Karl Seydel, assignors to the German Dyestuff Trust (I. G. Farbenindustrie A.-G.), (U. S. P. 1,600,700, Sep. 21, 1926), it has been found that esters formed from paraffine dicarboxylic acids and hydro-aromatic alcohols are excellently suitable as plasticizers and solvents for cellulose esters and therefore are valuable substitutes for camphor especially as they have high boiling points and consequently volatilize only with difficulty from the compositions. Most such compounds are solid bodies at ordinary temperature and all of them are very stable. Under the term "paraffine dicarboxylic acids" are meant dicarboxylic acids derived from saturated aliphatic hydrocarbons, with the exception of adipic acid, including oxalic acid and those derived from hydrocarbons of the cyclo-paraffine series. The new plasticizers produce tough, smooth and soft cellulose ester plastics both with cellulose nitrates and acetates and therefore may be employed in most varied manners in the industries of varnishes, films and celluloid. They may be used either alone or together with other plasticizers or solvents of low or high boiling point.

The following examples will further illustrate how the invention may be carried out in practice.

Example 1.

Di-cyclo-hexyl oxalate prepared in the usual manner from oxalic acid and cyclo-hexanol has a boiling point of 171° to 172°C at a pressure of 11 millimetres and a melting point of 47°C. For making films, 5 parts of it are mixed with 10 parts of pyroxylin and from

30 to 40 parts of ethyl alcohol. A clear solution is obtained which after evaporation of the alcohol leaves a clear transparent, smooth and flexible film.

The proportions may be varied within wide limits; instead of ethyl alcohol, other solvents may be used; further, other cellulose esters or oxalates of other hydroaromatic alcohols may be employed.

Example 2.

Di-cyclo-hexyl succinate obtained in the usual manner from succinic acid and cyclo-hexanol has a boiling point of 212°C under a pressure of 21 millimetres. This ester is excellently suitable as a softener for cellulose nitrate and is very stable when heated together with such cellulose esters; therefore, it may be used advantageously for making celluloid for example by kneading the ester with a cellulose nitrate at a fairly elevated temperature.

Thiolite Resin

(Continued from page 13)

rod can be electrified by friction and will act in every way as would a correspondingly shaped piece of amber, attracting light objects in the same manner.

The insulating properties of the new resin have been studied by the French Laboratoire Central d'Electricite and the following results obtained:

Resistance: 300x10⁶ megohms per centimeter. This remarkably high insulating power explains why it is possible to electrify the material so readily by friction.

Specific inductance: about 4.5.

Dielectric losses at high frequency: $C = 54 \times 10^6$.

From a purely scientific point of view the remarkable high dielectric strength is very remarkable and remains to be explained by further research upon the constitution of this new substance.

In answer to inquiries as to where Thiolite is to be obtained: The Manufacturers are Societe Levy-Samuel et Levy, No. 90, Avenue du Bac, Joinville-le-Pont, France.

Dielectric strength, or resistance to puncture:

Thickness of sample	Working Tension in volts	Breakdown voltage, calculated to 1 mm. thickness
4.1 mm.	58,000 volts	19,900 volts
2.1 mm.	35,000 volts	23,600 volts
1.6 mm.	33,000 volts	29,100 volts
1.3 mm.	28,000 volts	30,400 volts
1.0 mm.	24,000 volts	33,900 volts
0.1 mm.	6,500 volts	91,800 volts

Percussion Molding

Following the recent description of Percussion Preforming in the November number of PLASTICS, it is interesting to learn that the General Electric Co. has a patent (Thomas A. Wry, U. S. P. 1,593,376; July 20, 1926) for the actual molding of electrical insulators, and the like, by percussion instead of by hydraulic pressure.

Molding by pressure alone

by a single stroke requires an exceedingly high pressure for proper operation and does not as completely remove trapped air, as is desirable.

In accordance with Mr. Wry's invention, the material is molded by a succession of blows. By so doing a lower molding pressure and lighter apparatus can be used with the production of a product which has a greater

(Continued on page 29)

Aladdinite

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1st in U.S.



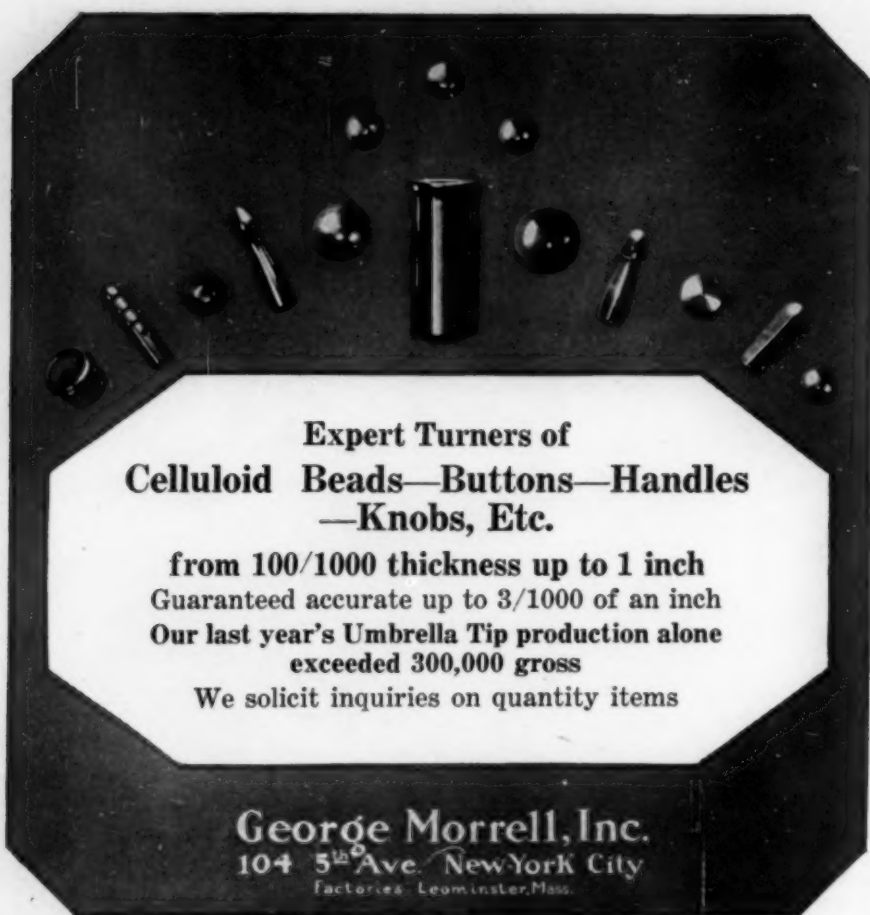
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We solicit inquiries on quantity items

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Manufacture of Casein Solids

(Continued from page 12)

time, but this can be taken safely as about 15 minutes, at least. The various liquids which are to be incorporated with the casein should be added steadily and slowly, as this will in the end shorten the process in incorporation.

If the mixing machines are not directly individually motor driven (which is preferable), but receive their power from belts and shafting, neither of the latter two should under any circumstances be directly above the machine, as this would be sure to lead to dirt, oil and other contaminations to drop into the mixture. The same applies to all machinery used in this industry; in fact the greatest care must be exercised to keep everything spotlessly clean—if success is to be attained. Certain types of mixer allow for covers; which makes it easier to keep the material clean.

The power consumption for mixing is comparatively slight. From 2 to 3 HP are usually enough. The mixer should not be too large, and a very satisfactory capacity is from a minimum of 30 kilograms to 80 kilograms. (66 to 175 pounds).

(This valuable contribution to the art of making casein solids will be continued monthly. To be sure of getting the whole story you should be a subscriber to PLASTICS. Back numbers of this magazine are in most cases out of print.)

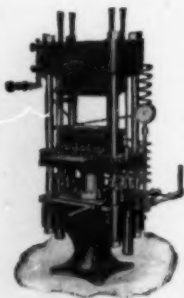
New Cellulose Acetate Plant in England.

Assistant Trade Commissioner, C. Grant Isaacs, London, reports that Courtaulds, (Ltd.) Coventry have in course of erection a plant for the manufacture of cellulose acetate. It is planned to use the entire output in the production of rayon by the acetate process.

MOLDING PRESSES

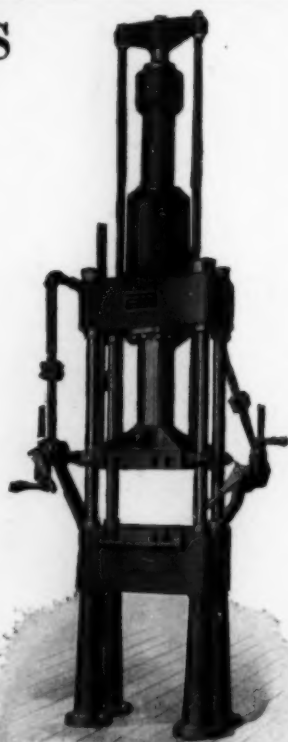
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Fig. 1
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Under the name of **The Hydraulic Press** the first issue of this magazine has just come into our possession, and we are very favorably impressed with it. The sixteen pages of text cover quite a large field, and show the numerous uses of hydraulic presses in various industries.

The subject matter includes an article on Woodworking, force-fits for putting cast iron spindles into iron drums used on carding machines, a general article on Bakelite, Storage battery production, and various other allied material. The various high-pressure valves and equipment also as mentioned.

The "Hydraulic Press" is published by the Hydraulic Press Mfg. Co., and will be sent, so the announcements accompanying the first number say, free of charge to all who are interested in the subject. For the present the plans call for four issues per year. Howard F. Mac-Millin is the editor.

Percussion Molding

(Concluded from page 26)

strength and is more homogeneous in composition.

The invention comprises the apparatus used, which is illustrated and described in great detail in the patent in question. The device is a modification of the pneumatic hammer. The molding material consists of asbestos, ground mineral fillers and asphaltic or gummy binding materials.

Molded Products

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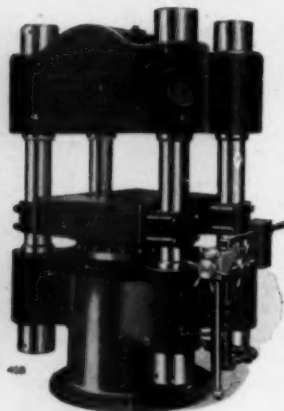


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Safeguarding Pyroxylin From Fire

(Continued from page 18)

practice to discard the latter on to the other factory scrap, with the danger of setting it on fire.

Heat Developed by Burning Pyroxylin Plastics

The heat evolved by complete combustion has been measured in the course of several researches on different varieties of the plastic. It amounts to from 3,500 to 4,500 kg calories per kilo, according to composition.

The heat of decomposition is appreciably less than that of complete combustion. This is an important consideration in the protection of magazines where the quantity of plastic is very large relative to the volume of air, for then complete combustion will be impossible owing to insufficient air. There is thus only the danger of decomposition, and if the automatic sprinklers can absorb the heat of decomposition more rapidly than it is evolved, the fire can be put out or, at least, controlled.

No figures for the heat of decomposition are given in books on the subject. They should work out at about 350 kg calories, taking as basis the temperatures obtained in some American experiments on magazines for pyroxylin plastics. Calorimetric experiments made by the Eastman Kodak Company with film decomposing in carbon dioxide, give the figure as 480 kg calories per kilo.

(This article will be continued in a forthcoming issue of PLASTICS.)

Molding Without Presses*(Continued from page 17)*

peratures and pressure, since the material can in fact if the temperature is kept low be hardened at atmospheric pressure, although this for the purposes described above is open to the objection that it takes a much longer time to effect.

Obviously, the invention is not limited to the production of a facing for artificial gums, but may be used for facing the vulcanite palate or any other object with material if desired.

From the above description, it will be apparent that human features, artificial limbs and the like can also be formed of or faced with phenolic condensation product by using plaster of Paris molds coated with oil and effecting the hardening with the vapour of a volatile liquid approximating to the conditions of temperature and pressure indicated.

Instead of the mixture of oil and whitening, any other suitable oil-containing medium of sufficient consistency to cover the material when the plaster is being applied may be used.

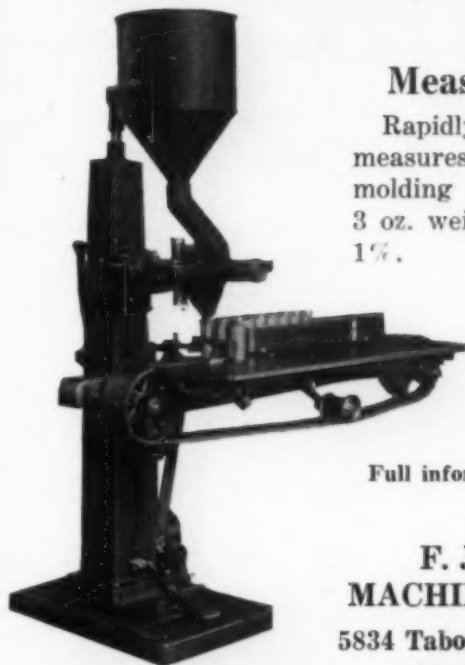
For example, a fruit could be slightly oiled, a plaster cast taken, and from this negative cast a mold worked up from which molded objects could be made.

It would be necessary to always use the phenol resins either, in fact such self-hardening plastic compositions as magnesite cements, or even plaster of Paris itself might be called upon. With suitable coloring a perfect imitation of the object might be made. Another alternative presents itself in the form of the commercial cheap low-melting waxes.

Casein Solids

in Europe

See Feb. Plastics

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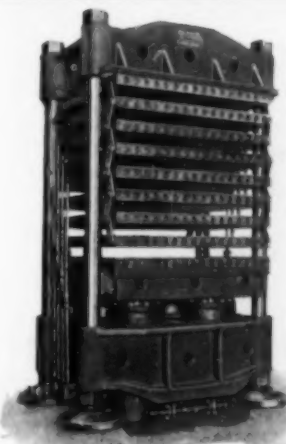
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Akron, O.
100 E. South St.

TECHNICAL ABSTRACTS AND PATENT REVIEW

Manufacture of molded goods from latex and fibrous material. F. Yake, U. S. P. 1,600,047; Sept. 14, 1926.

In the manufacture of molded or pressed goods from paper-making materials, adding to the materials, while in the beating engine, a latex having a hydro-carbon base, such as rubber, balata or gutta percha, together with a coagulant, beating the latex-treated material to a pulp, afterwards removing any excess of moisture on a paper-making machine, then disintegrating the soft sheets thereby formed, and finally molding the resultant plastic mass to the desired shape of article to be produced and drying.

Phenol Resin Products Containing Oxycellulose. Wm. Hunter and J. G. Fairgrieve, assignors to William Tod Junior & Co., Polton, Midlothian, Scotland. U. S. P. 1,579,112; Mar. 30, 1926.

A waste material available in very large amounts at certain paper mills, especially those working up esparto grass into paper, is used, together with the lime and calcium hypochlorite which it naturally contains, as a catalyst in the condensation of phenol and formaldehyde. The cellulose product due to the far-reaching oxidation to which the material has been subjected is practically oxycellulose.

The waste oxycellulose material, which is in the form of a pulp, is first dyed and then finely ground and mixed with phenol and formaldehyde at the preliminary condensation carried out at 50 deg. C., the product acquiring a granular character. This preliminary product is ground up and used for the molding operations which complete the condensatoin and polymerization. The best results are obtained when the percentage of calcium oxide in the waste product used lies within the limits of about 4% to about 8% and the percentage of hypochlorites from 0.5 to 1%.

Indophenols as Catalysts in Phenol-aldehyde Condensation; artificial Resin Production. August Regal, of Brno, Czechoslovakia. U. S. P. 1,584,472 and 1,584,473; May 11, 1926.

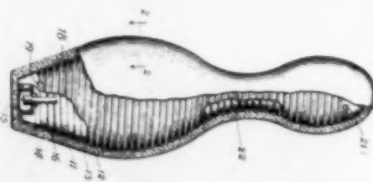
The process is based on the discovery that the indophenols formed during the condensation of formaldehyde with phenol are themselves excellent catalysts. For this purpose para-aminoaryl compounds are added to phenols and the formation of indo-

phenols effected; after which the regular amount of formaldehyde is added.

Example: To 1000 parts of phenol are added 1 part of para-aminodimethylaniline and the mixture heated on the waterbath for about 1 hour. A small quantity, say 0.05 part of permanganate are added to destroy the remainder of the para-aminodimethylaniline. 800 parts of 40% formaldehyde are then added and the mass heated under a reflux condenser until the initial viscous condensation products separates from the water which lies above the resin. The water is either decanted, or, preferably, distilled off in a vacuum. The dyestuff formed within the resin is destroyed by addition of dilute mineral acids which are best added just before the distillation of the water.

In the second patent 400 gms. of 40% formaldehyde and 2 gms. of dimethylaniline are heated together and then 100 to 150 gms. hexamethylenetetramine and the same amount of paraformaldehyde are added. After some time the boiling is interrupted and 1000 gms. of phenol are added and the condensation then carried out in the usual way.

Celluloid-covered Bowling Pin. Ernest Hedenskoog, Muskegon, Mich., U. S. P. 1,585,857; May 25, 1926.



A bowling-pin comprising a hollow body, a portion of the body being grooved, a wire wrapped in the groove and secured to the body at its opposite ends, means for admitting and holding compressed air in the body of the pin and an outer covering of a plastic material such as celluloid molded about the body of the pin. The figure is a side-elevation, the parts being broken away to show the construction.

It consists essentially of an inner body 11 and an outer body 12 and a wire-connection 13 between the two. The inner body which is made of metal is filled with air under high pressure in accordance with U. S. P. 1,519,835; Dec. 16, 1924, this air being admitted through a valve at the bottom of the pin. After inflation the valve is sealed by a plate 15. The wire serves to hold the pressure and also to insure a tight-fitting celluloid covering 22, which is molded about the pin.

Laminated Indurated Plates for Making Gears, Etc. Emile J. Guay, assignor to General Electric Co. U. S. P. 1,583,592; May 4, 1926.

A laminated product suitable for making gear wheels, is produced by stacking up sheets of woven material with powdered adhesive or resin between the layers, and then subjecting the stack of hydraulic pressure, from 600 to 900 lbs. per square inch, while at the same time heating sufficiently to fuse the resin or adhesive. Bakelite in powdered form, or shellac is preferred, but other forms of adhesive may serve the purpose. The woven material is preferably placed so that the warp of the successive pieces is at right angles to each other.

Preparing Pentaerythritol Tetracetate. Hans T. Clarke, assignor to Eastman Kodak Co. U. S. P. 1,583,658; May 4, 1926.

Pentaerythritol tetracetate, a material serving as a plasticizer in cellulose films dopes, is made by heating pentaerythritol with glacial acetic acid in the presence of a catalyst such as concentrated sulfuric acid. The water which forms during the acetylation is distilled off. On completion of the reaction the sulfuric acid is destroyed by adding sodium acetate, which forms sodium sulfate and acetic acid. Distillation under vacuum serves to remove all the acetic acid, and finally the product itself is distilled under vacuum. It boils at 184° to 186°C at 9 mm. pressure and 190° to 192°C at 20 mm. If desired especially pure, the pentaerythritol tetracetate may be recrystallized from hot benzene, from which it will separate on cooling in the form of colorless needles.

Molding Artificial Stones With Inscriptions. Joseph E. Cochran, Memphis, Tenn., assignor of one-half to Ellis T. Crawford, Charleston, W. Va. U. S. P. 1,587,698; June 8, 1926.

To provide inscriptions in molded artificial stone, as for example monuments and grave-stones, suitable sized type is attached to metallic mold pieces by means of a water-soluble cement, preferably sodium silicate. After the cement has dried, the type is covered with a thin layer of a mixture of paraffin wax, carnauba wax and stearic acid, so as to protect the water soluble cement from the action of the moisture in the artificial stone mixture. The stone is then poured. During the setting of the cementitious mixture comprising the stone proper, the moisture will sufficiently penetrate the waxy mixture to cause the type

to leave the metal plates so that when the mold is stripped the type will adhere to the stone. A sharp blow with a blunt instrument will however detach the type from the depressions in the stone, leaving a perfect inscription, and the type ready for re-use.

Ester-gum Resin Containing Rubber. Cyrus Field Willard, San Diego, Cal. U. S. P. 1,587,622; June 8, 1926.

The ester-gum resins are improved by the addition of de-vulcanized rubber. Resin is treated with 10%, more or less, of glycerol in the presence of 3%, more or less, of ferric oxide, which acts as a catalyst; and from 7 to 15%, more or less, of de-vulcanized or reclaimed rubber, heating until the rubber and resin has united to form the new product. It is suitable for enamels, paints or other purposes for which an elastic but hard resin can be employed.

Hair-waving Comb. Dora P. Gleason, Cincinnati, O. U. S. P. 1,585,703; May 26, 1926.

Combination of a pair of combs, each comb being provided with a lug at its end, the lugs overlapping and being hinged one upon the other. Methods of using the device are illustrated and described.

Floor Putty Having Cellulose Nitrate Base. Arnold M. Taylor and Frank A. Buote, Stamford, Conn., assignors to Atlas Powder Co., Wilmington, Del. U. S. P. 1,582,705; Apr. 27, 1926.

A floor putty consisting of butyl acetate 48 parts, vegetable oil (linseed) 36 parts, cellulose nitrate 10 parts, clay 100 parts. It is especially designed to be used as a crack filler under such coating compositions as the new pyroxylin lacquers.

Molding Machine for Containers Such as Battery-boxes, Etc. Marinor Bello, Highland Park, Ill., assignor to Bella Byfield Corp., Waukegan, Ill. U. S. P. 1,585,643; May 25, 1926.

Special form of hydraulic press, described and illustrated in great detail, for the molding of such containers as battery-boxes starting from a lump of plastic or vulcanizable material.

Ophthalmic Mounting. G. L. Tully, assignor to American Optical Co., U. S. P. 1,600,607; Sept. 21, 1926.

Deals with a pyroxylin plastic covered metallic "bridge," which is inserted into the zyl eye-pieces. The object is to get a more readily adjustable eyeglass frame.

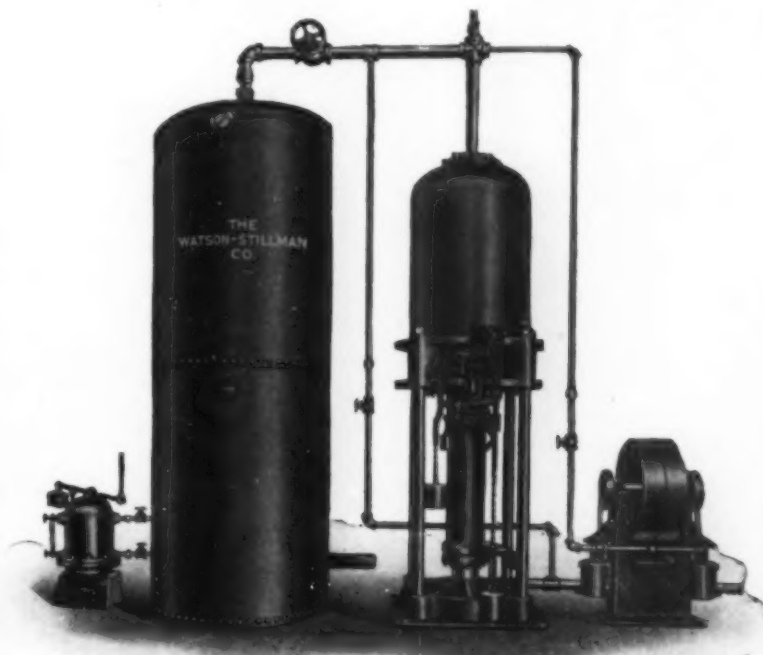
(Continued on page 34)

Methods of molding battery boxes will be described in the February issue of PLASTICS.

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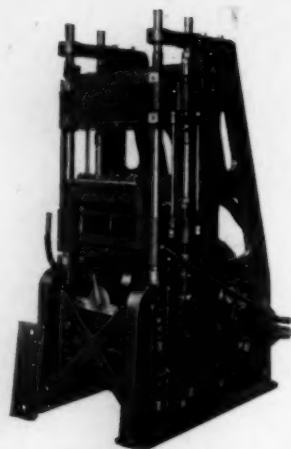
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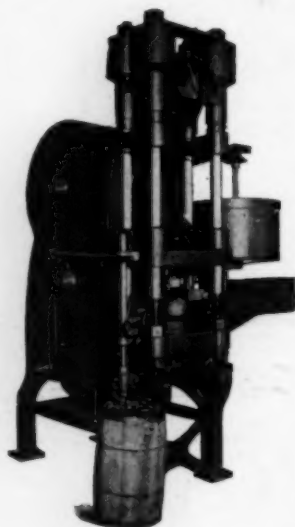
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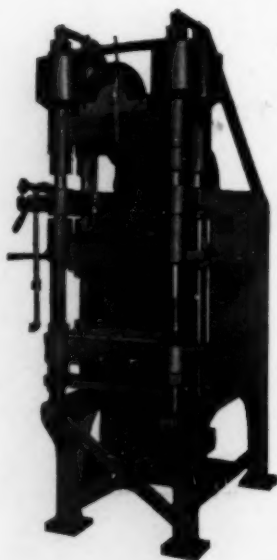
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Technical Abstracts and Patent Review

(Continued from page 33)

Ophthalmic Mounting. F. A. Stevens, assignor to Bausch and Lomb Optical Co., U. S. P. L,600,606. Sept. 21, 1926.

The essential features provide for an endless zylonite rim having a lens-receiving groove of a calibre substantially equal to the dimensions of the lens, one side of the groove being cut away to permit entry of the lens, the groove being provided with a wall to retain the lens in the groove. The turning of the lenses is thus effectively prevented.

Ophthalmic Mounting. F. A. Stevens, assignor to Bausch and Lomb Optical Co., U. S. P. 1,600,605; Sept. 21, 1926.

Constructural details of a combined metallic and zyl eyeglass frame.

Temple for Ophthalmic Mountings.

W. H. Moutelle, assignor to American Optical Co., U. S. P. 1,599,871; Sept. 14, 1926.

Concerns itself with the use of a wrapping of "cellulose composition" around the spring-like ear-loops of zyl eye-glass frame.

Thermoplastic Composition. C. E.

Swett, assignor to H. H. Beckwith. U. S. P. 1, 599,598; Sept. 14, 1926.

A thermoplastic material suitable as the base for shoe-stiffeners, is made from 4,400 lbs. of rosin, 700 lbs. of copal, treated with 115 lbs. of lime. The resin soaps thus formed are allowed to remain in the mixture. There are next added 1000 parts of a hard wax, as carnauba, candelilla, shellac wax or Montan wax, the last-named being preferred. The mass then receives an addition of 150 lbs. of China wood oil which has been polymerized to an incipient gel form. The thermoplastic base obtained is then mixed with wool felt, or the like, and the final product used for making shoe stiffeners. The particular advantage is said to reside in the fact that the material sets very rapidly on cooling. Claims cover "a thermoplastic composition of matter, suitable as a stiffening agent for fibrous parts of shoes, comprising acid resin, hard wax, resin soap and drying oil."

The Editors of PLASTICS are interested to know if readers want more abstracts, and especially if there is any real demand for reviews of foreign patents.

Your comments are cordially invited. Copies of U. S. Patents can be obtained from the U. S. Patent Office, Washington, D. C., for 10c. each in coin or coupons.

Credits

(Continued from page 24)

adaptation came into being and he was all shot to pieces. Then of course, sets were sold way below manufacturing cost and in the liquidating process the concerns who supplied him the materials and parts were left high and dry. Other contingencies often beset the radio manufacturer with a like result.

Many molders of radio parts know to their sorrow all the details of these transactions and yet new losses are incurred every day.

In the struggle for business, many molders make the mistake of taking chances even though they are doubtful about the credit. In other cases the molders do not know the reputation or financial condition of the people they are doing business with and take a chance in spite of that.

This uncertain and harmful condition can be and should be overcome.

One good way to lessen these credit losses would be for the molders to cooperate and furnish each other with data that would keep each man properly posted. By doing this competition would be beneficial and not destructive to all concerned.

Cellulose Acetate in Italy.

According to E. Humes, office of commercial attache, Rome, the Fabbrica Italiana Materie Coloranti Bonelli with plants at Cesano Maderno has decided to commence the manufacture of cellulose acetate. New plants are now under construction but information is not available as to when they will be ready for production.

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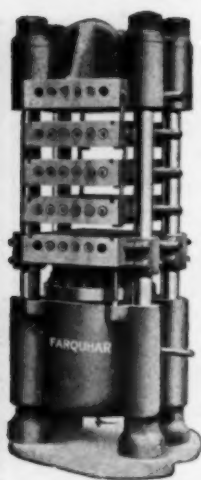
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Future of Plastic Materials Interestingly Predicted

MORE and more it is being recognized by the more far-seeing of the modern business men, that the day of synthetic materials is not only dawning, but is already in the state of a rosy morning, that promises to ripen into glorious noon. In the magazine "Nation's Business", (Vol. xiv. No. 9, p. 13) Gerald Wendt speaks of the "Synthetic House of Tomorrow."

In this entertainingly written essay, the author touches upon the scientific changes that have been brought by research, and lays particular emphasis upon the use of the synthetic materials which are destined to replace both wood and metal for construction purposes. Speaking particularly of the interior of the future home, Mr. Wendt says:

"But it is in the interiors that the most startling changes will come. Walls, wall coverings, floors, woodwork and furniture will all be composition, or synthetic materials. For one example, take the molded plastics or resinoids, such as Bakelite. For each of their present thousand uses there will be another thousand in a few years, especially if their cost of manufacture can be reduced, and this in turn, is merely a question of intelligent scientific research.

Not long ago these resinoids were "artificial amber" for use in beads, pipe-stems and cigarette-holders. Today, speaking of domestic uses only, they can be discovered everywhere as ash trays, door-knobs, lamp pulls, electric light switch plates, drawer pulls, percolator handles, casters, picture frames, pencils, radio panels, and toilet seats.

Resinoid Furniture Will Come

In England they replace pottery and silver for fruit stands, card trays, bowls, and chinaware. Tea served in cups, saucers and plates made entirely of molded plastic is not uncommon. And tomorrow will come resinoid furniture. Desk-tops and dresser tops are already on the list. Lighted cigarettes may be laid on them and allowed to burn without damage. Water, inks, alcohol rubs, hair tonics and medicines may be spilled with no effect on the finish. Any color or texture is possible from clear and transparent to ebony.

By a new photographic-lithographic process the surface appearance of actual wood samples, be it mahogany, walnut or oak, can be so perfectly transferred to the resin that a wood expert can scarcely distin-

guish it from wood. No fire, no deterioration, no limits to decoration, finish or shape—obviously such a material will replace wood for furniture and interior fittings.

It is superior to wood in every respect except weight, and that may be overcome by hollow moldings, possible because of its great mechanical strength.

Present-day imagination is probably not capable of foreseeing the mechanical and artistic changes that it will produce, just as the skyscraper was not conceived until after the steel had been tried in use, and the automobile was just a horseless carriage in its first few years.

Synthesis Is Keynote of Future

And what are resinoids made of? Two very simple chemicals are combined, namely formaldehyde and phenol. Natural gas, coal tar, and wood distillation products are the raw materials. It is an ideal case of using these great natural resources for their highest value, i.e., as chemical materials. It is a symptom of the future."

The article deals further with the production of artificial silk the future of radio and similar subjects.

B. Blumenthal & Co. Observes Anniversary

Button Impoters and Manufacturers Celebrate End of Half Century at Dinner.

The 50th anniversary of the founding of B. Blumenthal & Co., importers and manufacturers of buttons, was celebrated at the Hotel Astor, at a dinner attended by 150 members of the organization. The occasion was also a reception in honor of the retiring partners, E. Newberger and Robert G. Blumenthal. Resolutions of regret were presented to Mr. Newberger and Mr. Blumenthal by the employees, and substantial bonuses were made to all employees who had been with the organization over a year, the amounts varying in accordance with the length of service of each individual. Gold watches and pencils were presented to the sales force.

Phenol Resins Used in Brake Linings

Brake lining, friction disc facing and similar devices are made with a special form of phenol resin containing materials to increase the plasticity and flexibility of the resins. A recent patent (U. S. P. 1,599,627) assigned to the Russell Mfg. Co. of Middletown, Conn., by the inventor, William Achtmeyer, covers the preparation of the necessary resins. The patent is a rather lengthy document, which goes into the chemistry of the manufacture of the various phenol resins by acid and alkali condensing agents. Particular advantages are claimed by the inventor for phenol resins made with "mineral acid esters" as condensing agents. Practically equimolecular proportions of phenol and formaldehyde, or, preferably, an excess of formaldehyde, are condensed in presence of hydrochloric acid esters of amyl alcohol (in other words, amyl chloride) or similar compounds (Ethyl chloride, methyl chloride, etc).

Resins

The viscous resinous product obtained is still in the fusible, soluble stages. Additional plasticity can be given to the material by the addition of alcoholic solutions of thymol and castor oil, the thymol serving to keep the castor oil from separating from the resin. As friction increasing substances, such materials as anhydroformaldehydeaniline, or diphenylmethane derivatives may be added (specifically: methylenediphenyldiamine).

The anhydroformaldehydeaniline can be formed in the resin by adding aniline oil to the imperfectly condensed material, this also serving to remove the excess of formaldehyde from the product. The claims cover, among other things, the process of preparing useful indurated materials and articles, which comprises reacting upon phenol with an excess of formaldehyde

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USEFUL BOOKS

Plastics and Molded Electrical Insulation.

Emile Hemming. 313 pages. Illustrated. \$6.00.

Very special care has been taken in the preparation of the chapter of molded insulation. Contains hundreds of references to plastic and composition products and their utilization.

Celluloid.

Its raw material, manufacture, properties and uses.

Dr. Fr. Bockmann. 188 pages. 69 illustrations. \$3.50.

In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them more plastic also occupy attention.

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. \$3.00.

An authoritative work dealing with the materials and manufacture of pyroxylin solutions and with their application in the industry.

Cellulose Ester Varnishes.

F. Sproxton. 1925. \$4.50.

An exceptionally well-written book on the general subject of the cellulose ester lacquers. Up-to-date and sufficiently non-technical to be of inestimable use to manufacturers.

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. \$8.00.

The book will serve as a guide and prove a stimulus to the numerous investigators and practitioners in the field of artificial resins. The section of plastic molding is especially valuable.

Any of the above can be obtained by writing to

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in the presence of a mineral acid ester to obtain a soluble condensation product, imperfectly separating watery products from the reaction mass, mixing with the residue a quantity of aniline only about sufficient to combine with the formaldehyde present and the acid contained in such watery products as are retained, thinning down the mixture with a suitable solvent, impregnating absorbent material with the solution, and heating to harden the resultant composition.

New Catalyst for Manufacture of Cellulose Acetate

THE manufacture of cellulose acetate has been the subject matter of a great number of patents, and the catalytic materials disclosed by the various inventors have been highly diversified.

The Eastman Kodak Co., which have done considerable to advance the art of the cellulose esters, is the assignee of U. S. Patent 1,591,590, of William R. Webb and Carl J. Malm, for the most recent process of esterifying cellulose with acetic acid.

According to this process, red phosphorus and gaseous chlorine are used to catalyze the reaction between the cellulose (cotton, paper, wood pulp etc.), and the acetic anhydride and acetic acid. A suitable acetylating bath is stated to consist of 500 parts of glacial acetic acid and 600 parts of acetic anhydride; this sufficing for treating 100 parts of clean cotton. From 1 to 10, (say 4) parts of red phosphorus are added to the mixture and then chlorine is bubbled in until it ceases to be absorbed.

The acetylation then proceeds rapidly, at from 60 to 65°C, being complete in five or six hours. The advantages claimed are less degradation of the cellulose molecule, clearer products and better control of the operation.

Recent Trade-mark Applications

Serial No. 234,228. Rheinische Gummi-und Celluloid-Fabrik. Mannheim-Neckerau, Germany. Filed July 6, 1926.

Celid. For Pyroxylin Plastic compounds.

Serial No. 234,729. Patek Bros., Inc., Milwaukee, Wis. Filed July 19, 1926.

Pat-Lac. Lacquers.

Serial No. 234,876. The Sherwin-Williams Co., Cleveland, O. Filed July 21, 1926.

Opex. Cellulose nitrate lacquers and enamels, etc.

Trade Mark No. 218017. The Glidden Co., Cleveland, O. Filed July 23, 1925; Serial No. 217,767.

Lacq. Lacquer, etc.

Serial No. 222,839. Gevaert Photoprodueten N. V., Belgium. Filed Nov. 5, 1925.

Novaflex. Photographic films, etc.

Serial No. 232790. Marietta Paint & Color Co., Marietta, O. Filed June 5, 1926.

Lac-amel. Lacquer enamel.

Serial No. 233,145. Pittsburgh Lacquer & Chem. Co., Pittsburgh, Pa. Filed June 12, 1926.

PLC. Pitt-lac. Lacquers.

Modeling Clay

Earl P. Snook makes a "plastic composition adopted to form a modeling clay, comprising eight ounces of glue, 11½ ounces of water, 8 ozs. of boiled linseed oil, 1 lb. of titanox and six pounds of whiting." (U. S. P. Re-issue 16,435; Oct. 5, 1926; original patent 1,568,098; Jan. 5, 1926.)

Mimeograph Stencils

Celluloid, or a similar pyroxylin plastic, in solution is used by A. B. Dick & Co., of Chicago, to make stencils for mimeograph purposes. Japanese Yoshina paper is coated or impregnated with a 2½% solution of "collo-

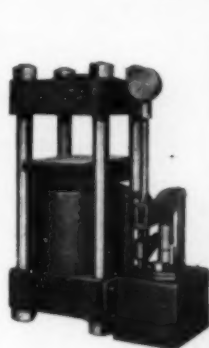
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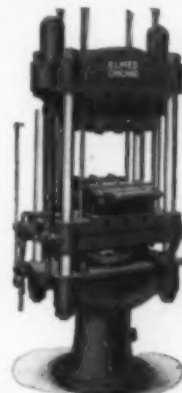
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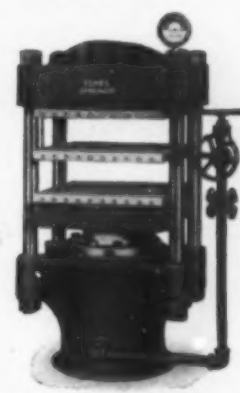
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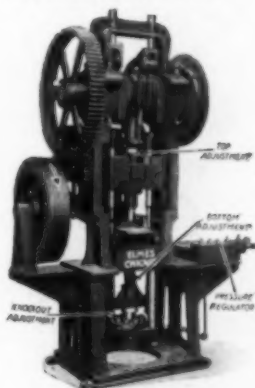
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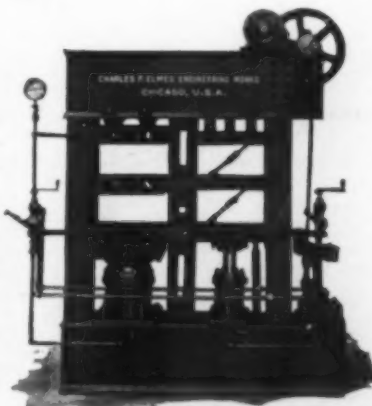
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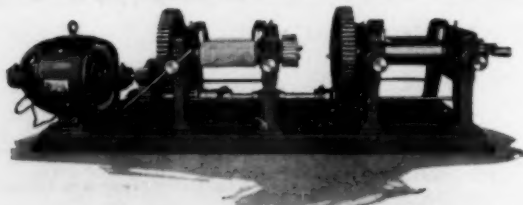
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dion or celluloid" to which has been added 40% of castor oil. The function of the latter is to keep the material tough and leathery.

(U. S. Pat. 1,592,340; July 13, 1926. Paul Campion).

Pyroxylin in Artificial Leather.

How widespread the use of pyroxylin in the manufacture of artificial leather is can be seen from some statistics just issued by the Bureau of the Census.

The figures, dated Dec. 13, 1926, are:

Pyroxylin-Coated Textiles.			
Pyroxylin-spread— 1926			
Sept.	Oct.	Oct., 1925	
3,470,000	2,954,000	2,987,000	pounds
Shipments billed—			
2,407,900	2,374,000	2,380,000	linear yards
Unfilled orders, end of month—			
2,067,000	1,625,000	1,852,000	linear yards

Heat-treating Phenol Resins

(Continued from page 15)

The results of the treatment are shown in this table:

	Before treatment		After treatment	
	°C.	°C.	°C.	°C.
Temp. of test	20	100	20	100
Volts per mil	505	60	550	428

In this particular case therefore the dielectric strength of the untreated material at 100° C was about 12% of its value at 20°C; whereas after treatment the dielectric strength at 100°C was nearly 85% of the original cold value, and over 75% of the cold dielectric strength of the treated article. These values are approximately representative for a large class of products, but are not to be regarded as restrictive of the invention.

The usual molding temperature for such of these molded phenolic compositions as are in the hot press (as distinguished from the so-called "cold-molding" process) is upward of 150°; it will be noted therefore that the preferred heat-treat-



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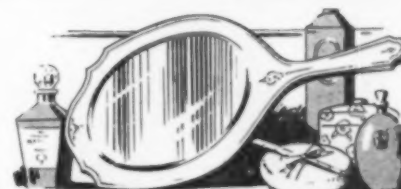
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ing or curing temperature according to this invention is near the normal hot-molding temperature. It is also below the usual after-baking temperature of the cold-molding process.

This invention is to be clearly distinguished from the after-baking step of the so-called cold-molding or quick-molding processes, which is applied to uncured molded products, and has for its purpose the accomplishment of the reaction of condensation, which reaction takes place, in the hot-molding process, in the press and during the act of molding. The heat-treatment of the present invention is applied to cured products, meaning thereby molded products which have undergone this condensation reaction, either during molding or subsequently thereto.



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